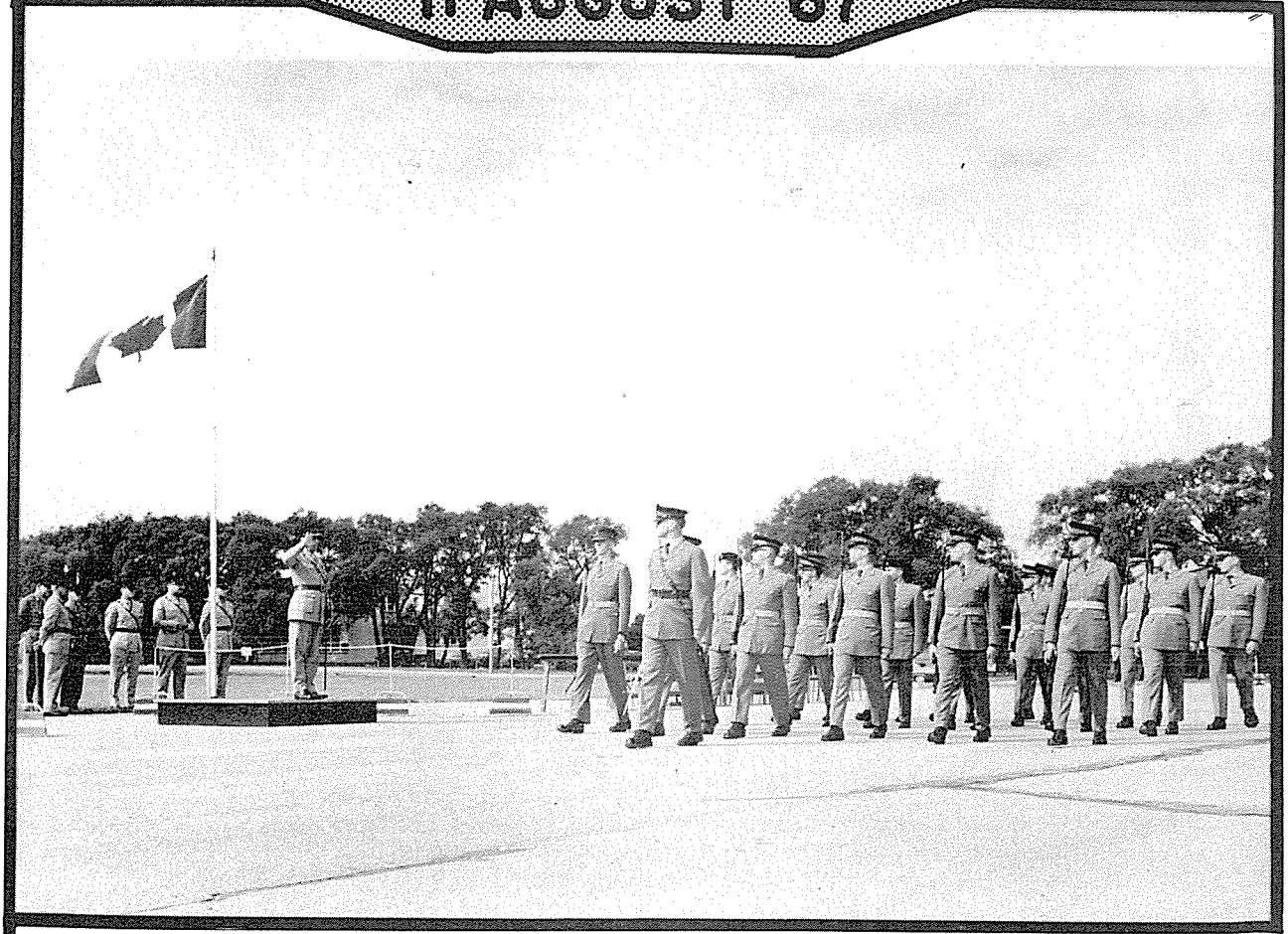
TECHNICAL BULLETIN

VOLUME 12 NUMBER 4 DECEMBER 1967

GRADUATION PARADE
11 AUGUST 67



RCEME TECHNICAL BULLETIN

THIS TECHNICAL BULLETIN IS PUBLISHED BY AUTHORITY OF COLONEL A L MACLEAN,CD, HEAD OF THE CORPS OF RCEME AND COMMANDANT, THE RCEME SCHOOL, WHO HAS APPROVED THE CONTENTS FOR PUBLICATION.

THE BULLETIN IS PUBLISHED TO INFORM RCEME PERSONNEL OF CURRENT TRENDS IN DEVELOPMENTS, TO CIRCULATE NEWS OF CORPS AND INDIVIDUAL ACTIVITIES, AND TO PROVIDE A FORUM FOR DISCUSSION AND THE EXCHANGE OF IDEAS BY MEMBERS OF THE CORPS.

THE VIEWS EXPRESSED ARE THOSE OF THE WRITERS AND DO NOT NECESSARILY REFLECT OFFICIAL OPINION OR POLICY, AND ARE NOT TO BE QUOTED AS AUTHORITY FOR ACTION.

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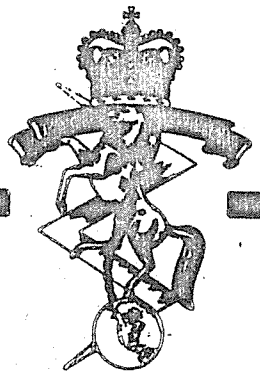

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NOTES FROM THE HEAD OF CORPS

THE CORPS

1. Although The Corps structure as we knew it no longer exists, RCEME officers, warrant officers, NCOs and men are still employed in the types of positions they have always held. The ultimate structure of the new land maintenance organization should be known in the near future. Whatever it turns out to be, I am sure that all RCEME trained personnel will continue to have as interesting and challenging jobs as they have had in the past.

2. As individuals, most RCEME personnel are pursuing successful careers in the Army today. There are two brigadiers and five colonels in the Army who are ex-RCEME officers. The Corps has 28 lieutenant-colonels, seven of whom were promoted to that rank in 1967. There are 77 majors in The Corps, nine of whom were promoted from captain in 1967. Four RCEME officers are attending the Armed Forces Staff College in Toronto (Majors Bourassa, MacDougall and Svab and Captain (Major as of 1 Dec 67) Adams). There are also four RCEME officers attending The Canadian Army Staff College in Kingston (Majors Graye, Miller, Pospisil and Wilson). Several RCEME captains have attended the Staff School in Toronto. There are 18 lieutenants on the current Subaltern EME Course. Three officers are attending post graduate courses and one is at university obtaining his Bachelor's Degree. So far this year, 12 officers have been commissioned from the ranks.

3. There haven't been as many promotions among the other ranks as in 1966, but the situation is still better than it was a few years ago, and should improve during the next few years.

TECHNICAL BULLETIN

4. As a result of the re-organization of Canadian Forces Headquarters and Headquarters Materiel Command, and because Mr. Paterson has retired, the RCEME Technical Bulletin is now being published from The RCEME School. It is planned to continue its publication on a quarterly basis for as long as it continues to serve the members of The Corps.

5. This is still your publication and reader interest is essential. You are therefore urged to provide the editor with items of technical or general interest for inclusion in subsequent issues.

MUSEUM

6. The Corps of RCEME Museum is now well established at The School. The official opening took place during the annual RCEME Corps Association Conference at 1500 hrs 21 Oct 67. Colonel R.A. Campbell, OBE, CD (retired) cut the ribbon. More about the museum will appear in the next issue of The Bulletin.

DINING-OUT DINNER

7. The Dining-Out Dinner for officers who retired during 1967 will be held at The Corps of RCEME Officers' Mess, Friday, 26 Jan 1968. It is expected that about 12 officers will be dined out at that time.

LAND MATERIEL MAINTENANCE STUDY PERIOD

8. Approval has been given to hold a Land Materiel Maintenance Study Period at The RCEME School from 24 to 26 Jan 68. It is hoped that as many senior officers of The Corps as possible will be able to attend. Senior RCEME officers at the following headquarters and units should receive their invitations in late October or early November:

CFHQ - DGM
DGOS

HQ Materiel Command
HQ Mobile Command
HQ Training Command
HQ Canadian Forces Land Europe
202 Workshop Depot
27 Central Ordnance Depot
The RCEME School
3 Brigade Experimental Service Battalion

9. Approval has been received for the Head of Corps to liaise directly with the above headquarters and units on details of the study period. Further information will be sent to those concerned in the near future.

RCEME CORPS OFFICERS' FUND

10. A meeting of the Executive Committee of The RCEME Corps Officers' Fund will be held during the Land Materiel Maintenance Study Period to discuss the future of The Corps Fund. Decisions made will be included in a subsequent issue of the Technical Bulletin.

THE SCHOOL

11. The School continues to be very busy with the student population varying between 500 and 600 most of the time. The Apprentice Programme is ending. The only army apprentices left under training are in The Corps of RCEME and there are 50 at The School now who will graduate in July 1968.

12. The 1967/68 course load is heavy. Some of the highlights are:

One Intermediate EME course
One Subaltern EME course
Three Master Vehicle Technician Group 4 courses
One Master Electrical Technician Group 4 course
One Master Instrument Technician Group 4 course
One Master Radar Technician Group 4 course
One Master Radio Technician Group 4 course
Two Master Weapons Technician Group 4 courses
12 Group 3 courses
36 Group 1 courses
Three Senior NCO courses (Parts A and B)

13. Although the School did not conduct Part A of the Senior NCO course last year, these courses are being conducted by The School this year. This will probably continue at least until the new pay level six courses are started.

McNAUGHTON BARRACKS

14. About three years ago it was decided at CFHQ to name the whole military complex east of the Cataraqui River "Camp Barriefield". Thus, Camp Barriefield now includes: The Royal Military College of Canada, HMCS Cataraqui, Old Fort Henry, Fort Henry Heights, Vimy Barracks and the property occupied by The RCEME School, the Canadian Forces Hospital Kingston and a few elements of Canadian Forces Base Kingston.

15. The area north of Highway No. 2 and east of Highway 15 used to be known as Barriefield Camp. A new name was required, and after much searching, "Milton Barracks" was selected and approved in 1965.

16. General The Honourable A.G.L. McNaughton, to date the only officer to hold the appointment of Colonel Commandant of The Corps since its inception in 1944, and was known personally by a large number of RCEME officers and senior NCOs. He took an active interest in the affairs of The Corps during his tour of office.

17. Therefore, early in 1967 approval was sought and granted to perpetuate the name of General McNaughton by having the area known as Milton Barracks renamed McNaughton Barracks. The official announcement of the change was made at the annual drumhead service held in conjunction with the twenty third anniversary of the birth of The Corps, held on Sunday 14 May 67.

18. Most of the land now occupied by McNaughton Barracks was a Crown Grant to a Mr. Grant in 1805. Grant sold it to Thomas Milton in 1880. Milton built the present Commandant's House in 1888. Milton sold the land back to the Crown in 1902. It has been owned by the Despartment of National Defence since that time.

19. So, The RCEME School is now situated in McNaughton Barracks, Camp Barriefield, Kingston, Ontario.

TATTOO

20. Captain Britt, Staff Sergeant Funk and the 50 RCEME Corporals and Craftsmen who took part in the Armed Forces Tattoo have completed their tour during which over 150 performances were given. Captain Britt is now with 2 Field Workshop and Staff Sergeant Funk is back at The School. The majority of Corporals and Craftsmen have been posted to 1 Field Workshop, 2 Field Workshop, and 3 Brigade Service Battalion. They are all to be congratulated on their fine performances.

IN MEMORIUM

We regret to announce the death of Brigadier George Milligan Grant CBE (Retired) on 4 October 1967.

Brigadier Grant, who was 70, served in the First World War in Europe from 1916-19. In 1925 he was appointed Superintendent of Vehicles of the Bell Telephone Company. In 1942, he was seconded to the Department of National Defence and as Director of Mechanical Maintenance was instrumental in the formation of the Corps of Royal Canadian Electrical and Mechanical Engineers.

In 1944, he was appointed Deputy Director of Mechanical Engineering and Senior RCEME Officer with the First Canadian Army. He served continuously with that Army in Europe until the end of the war. During this Service he was mentioned in dispatches and subsequently appointed Commander of the Order of the British Empire.

After the war, Brigadier Grant returned to The Bell Telephone Company and retired in 1962 as Vice President, Public Relations. He was a past president of the RCEME Corps Association and the Conference of Defence Associations.

EDITORIAL

As explained by the Head of Corps in his notes, a new editorial board has been appointed for the Technical Bulletin and this is our first edition. We sincerly hope readers will forgive us our obviously amateurish work. We, in our ignorance, accepted the task without realizing that professionalism in this field, as in others, requires skills and tools which in this case we do not possess. Our earnest wish is to improve this situation, and our appeal to you, the reader, is to assist us by providing contributions in the form of articles and news worthy items, thereby freeing the editorial staff to concentrate on the future editions.

Elsewhere in this issue is a tribute to Mr Paterson for the work he did as editor of the Bulletin. On behalf of all readers I can only add that his efforts were appreciated and that we feel as though a real friend has left our company.

WO2 Taylor's article raises a number of questions of organization, equipment and employment of radio technicians. We are looking forward to hearing from others of this trade who may disagree or otherwise.

The comparison of the Forward Repair Platoon and the British Forward Repair Group by Captain Hanson provides interesting reading.

We are sure Major Connell's reassurance with regard to our ascendancy over the computer will be received with relief.

Major Geary's call for the organization of a Technical Group invites readers who have had experience with foreign armies, to share them with us through this medium.

We hope readers enjoy the insight provided by Major Pospisil into improvement engineering procedures for aircraft maintenance.

Our thanks, go to Lt Nellestyn for taking time out from his studies at London University to provide us with the latest in the application of radio isotopes.

Our congratulations to all members who participated in the Track and Field meet. New records were set. Special congratulations to Lt D. Dorman.

It would be remiss of us not to congratulate the graduating class of cadets featured on our cover. These officers completed their training in August and we join with everyone else in welcoming them to the Corps.

AN EDITOR RETIRES

On 28 Jul 67 the personnel of Weapon Systems Management Land Section (ex DEME) of Materiel Command said farewell to Mr. D.C. Paterson.

Don Paterson is better known as the editor of the EME Manual and the RCEME Technical Bulletin. He served with RCEME from Apr 43 and retired from the service in Oct 57 as a Warrant Officer 2nd class. He continued to serve in the same position as a civilian until retirement last July.

In a tribute to Mr. Paterson Lt Col G.W. Bruce said that the whole of RCEME should have been present to say thanks to Don because his efforts have been used and enjoyed by all for twenty years. In reference to the EME Manual he was responsible for producing a high quality technical publication so necessary in an organization dealing in a vast variety of equipment. Because of his personal efforts the EME Manual has steadily improved over the years and today enjoys a high and enviable reputation.

He is best known perhaps for his persistent efforts in publishing the RCEME Technical Bulletin which has been enjoyed and appreciated by the whole Corps. It was not an easy job. Everyone wanted the bulletin, but not many came forward with articles to fill its pages. So by badgering, ferreting and stocking he assembled for twenty years the contents of the Technical Bulletin and the RCEME Quarterly. Its success is the real tribute to Mr. Paterson.

In presenting Mr. Paterson with a certificate of service and an appropriate gift, Lt Col Bruce wished him on behalf of the Corps best wishes for fortune, health and happiness and sincere thanks for a job well done.

RCEME OFFICER TRAINING

by

Lt W.B. Mason and Lt J.A.N. Nault

Lt C.N. Sochasky was the proudest spectator at the graduation parade of the twenty Officer Cadets who had completed the Second Practical Phase of RCEME officer training. In the picture above, taken during the graduation, we see Lt Sochasky presenting the award for the Best ROTP Officer Cadet on Phase II Training to his son, Robert. The award is donated by the Officers of the RCEME Corps and is a top-grade tailored Sam Browne Belt. O/Cdt Sochasky also has his name inscribed on a plaque that hangs in the Corps of RCEME Officers' Mess.

The graduation parade on the 11th of August 1967, was the culmination of ten weeks training at the RCEME School for the Officer Cadets. Three other awards were presented by the Reviewing Officer, Colonel A.L. Maclean, CD, Commandant of The RCEME School and Head of the RCEME Corps. O/Cdt J. J.P.S. Beaulieu won the General Proficiency Trophy donated by 5 Technical Regiment RCEME CA(M); the Technical Achievement Trophy presented by 34 Technical Squadron RCEME CA(M) was awarded to O/Cdt D.F. Ferguson; and finally the RCEME School Athletic Achievement Trophy was presented to O/Cdt J.R.A. Fortin on behalf of 28 Technical Squadron RCEME CA(M).

The ten weeks of Phase II Training are only one portion of the forty-four or more weeks of training that young RCEME Officers receive prior to their first posting. The first ten weeks are devoted to Phase I training which introduces the young officer cadet to the Army, and gives him the basic military knowledge which he will need throughout his career in any corps. During the next summer, the officer cadet spends ten weeks on the Phase II training peculiar to his selected corps.

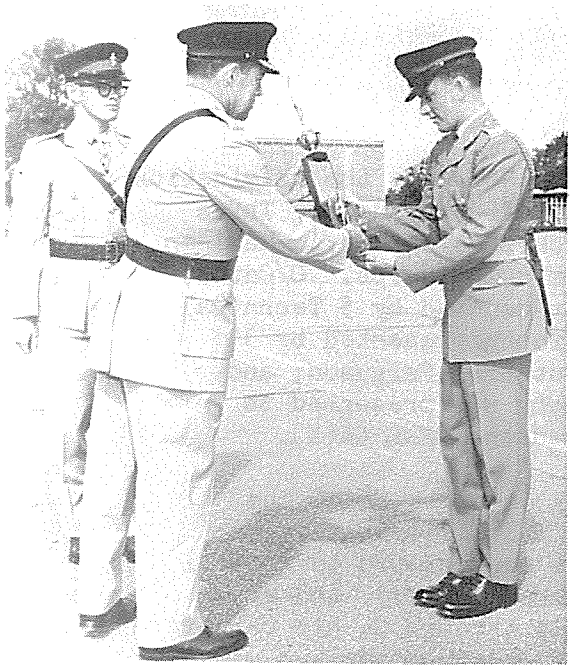
In RCEME, this is a review, confirmation and extension of knowledge gained in Phase I and a familiarization with the Corps of RCEME. The officer cadet learns the history, organization, responsibilities and procedures of his Corps. Much of the technical training received in the Phase will never be used by the cadets after their commission, however, it will give them an essential knowledge of the jobs performed by their men. It has long been known that if a person has had experience in a particular job, he is better qualified to command men at that job.

In line with this statement, and during Phase II the cadets receive training at Regimental, Armament, Electronics and Vehicle Companies. At Regimental Company, the cadets receive two weeks of lectures followed by a week in the field simulating a field workshop. In the field, they apply their knowledge and increase it by doing as many different jobs as possible. During the week, they get experience in laying out and moving a workshop, camouflaging a truck, defending a position, doing night fire picquet duty and many other jobs, some easy, some hard.

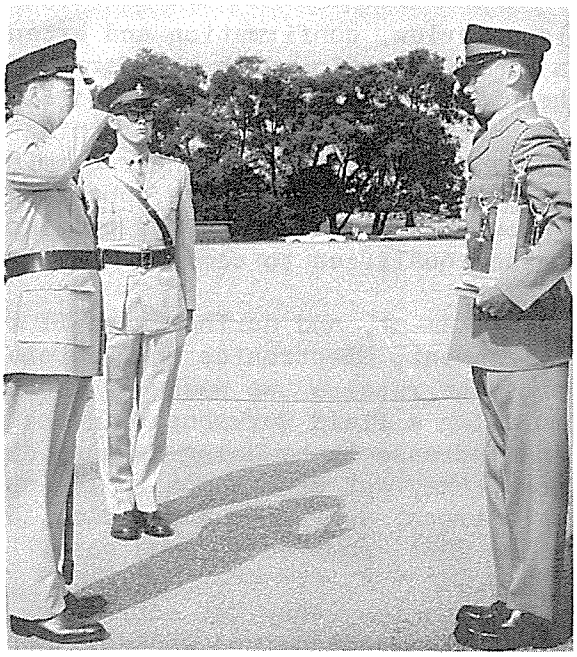
At the other three companies, they get experience in testing and repairing vehicles, weapons, instruments and radios. They work on the lathe and get demonstrations on equipment found in a complete machine shop. Most of these practical periods are preceded by lectures explaining the theory of the equipment to be repaired and the tools to be employed in repairing it.

One of the most difficult and interesting tasks on the course is the recovery of a tank that is half covered in mud at the bottom of a deep depression. After this exercise, most of the cadets are wet and covered with mud, but satisfied smiles are evident on all faces.

The cadets are now back at their respective universities or Canadian Services Colleges, buckling down to another hard year of academics. Ahead of them, there lies many long moths of work and study, both at college and on future military courses. However, they have a worthwhile goal ahead of them - a college degree and the Queen's Commission in the Canadian Armed Forces. Good Luck!

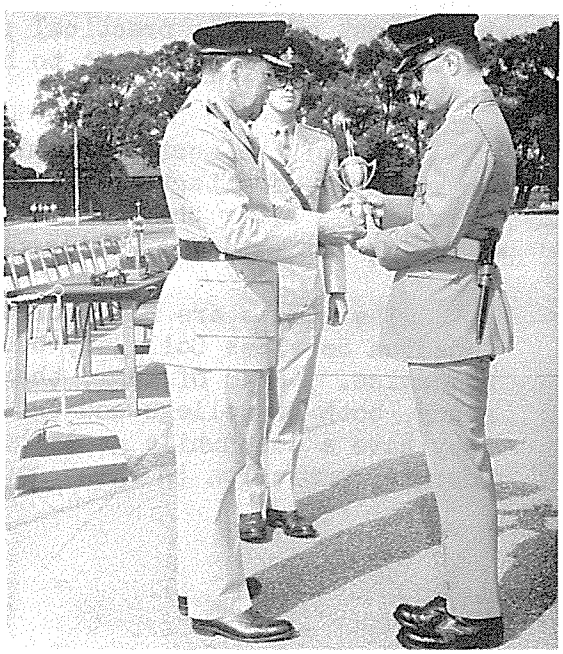


General Proficiency
Second Phase
Presented to
O/Cdt JJPS Beaulieu



Technical Achievement
Second Phase
Presented to
O/Cdt DF Ferguson

Athletic Achievement
Second Phase
Presented to
O/Cdt JRA Fortin



FLY IN BREAKFAST - CANADIAN STYLE

By SSgt Heichert R.R.
NCO i/c A/C Maint
C Sqn 8 CH

The day started out dull and cloudy with a promise of rain. Fog was heavy in the hills of the Teutoburger Wald in Germany. Thus started a day which was to mark a Canadian first in Germany.

Centenial projects were blooming throughout the Brigade. But members of the Helicopter troop of C Sqn 8 CH, with assistance from the squadron and RCEME personnel loaned to us from the A/C platoon of 4 Field Workshop, made plans to hold a "CENTENIAL FLY IN BREAKFAST".

Plans were roughed out early in May. From there they rapidly progressed.

We knew we had a 1000 ft. grass runway, plus parking space on the tarmac for about 10 to 11 small A/C. By looking around the land surrounding the airport, (which is approximately 2 miles east of Fort Chambly) we could make space available for approximately 90 additional A/C both rotary and fixed wing. RCEME tradesman spent many hours measuring and marking parking areas.

Invitations were made and sent to various Army Aviation Units of the NATO Forces in Europe asking;

Can you come?
How many are coming?
What type of aircraft will be coming?
Is fuel required? What type?

As the returns came in other problems arose, such as.

Where would we get the various fuels required?
How could we handle it?

But each problem was solved one by one.

The date had been set at 30 JUNE 1967.

Then came the questions;

What will we feed them?
What entertainment could we supply?

Steadily the replies came in. Of the 90 odd invitations sent out, two thirds were returned. From these we could expect approximately eighty aircraft and 300 people from Canadian, Belgium, American, Dutch and German units.

Things slowed down a bit while we attended the annual training in Sennelager.

The final week arrived. From dawn till dark plans were finalized and gradually the Fort Chambly Airfield took on the features of a giant circus.

Flags from the countries attending and those representing Centenial were prepared for mounting around the airfield. The area around the airport was measured and marked for the many different types of A/C expected.

RCEME personnel were responsible for setting up communications marshalling, parking and refuelling. These jobs were carried out in a very professional and satisfactory manner.

Personnel from the squadron were responsible for guiding, receiving and entertainment for the visitors.

Cooks from the squadron were responsible for the menu.

"D" day arrived, JUNE 30 1967.

The morning at 0600 was dull with fog patches. At 0645 the ground crew arrived, to set up communications and prepare the hangar for invasion. At 0700 the cooks arrived. Everyone was busy getting last minute items completed.

At 0755 our first visitors requested landing instructions. The first two to land were an H34 and an Alouette, from one of the German Army Units.

By 0830 there were nine A/C and the weather was rapidly improving. Weather wise the day was to be perfect.

Soon aircraft of both rotary and fixed wing could be seen approaching from 5 miles away. The airtraffic was getting heavy.

RCEME marshallers and refuelling crews were kept busy.

Visitors were lined up to sign the official guest register and receive breakfast.

By 1030 there were approximately 45 aircraft and 200 people were making new acquaintenances, and renewing old ones.

At 1145 the Brigade Commander Brigadier E.A. Amey DSO OBE MC flew in to take part. He congratulated all those who made the day so successful and expressed a desire to see it become an annual affair, possibly in conjunction with Armed Forces day. The day was a complete success.

At the last count there were 70 aircraft and approximately 300 people present for the FLY IN BREAKFAST CANADIAN STYLE.

To the best of the writers knowledge, no other unit has had the privilege of being hosts to such a function in Europe.

The entertainment for the day consisted of:

1. A film - "Helicopter Canada" which was excellent.
2. Western Music - made up of local talent - known as the Rhythm Ramblers.
3. Viewing of the various A/C on display.
4. Flying demonstrations by Cdn CF104s.
5. Rehearsals by units for July 1 displays.
6. Viewing of floats built by 4 CIBG units.

OH YES; The breakfast menu was;

Bacon and eggs
Fried potatoes
Pancakes w/maple syrup
Baked beans
Coffee
Cereal
Bread and butter

One German pilot is reported to have eaten 17 pancakes.

VIEW OF APRON AND HANGER FORT CHAMBLY
DURING FLY IN BREAKFAST

SPANNER SPEAKS

Another eventful month has gone by at the home of RCEME'S Fourth and Finest Field Workshop, and a month of change it proved to be. To open we bid a warm welcome to Lt Dennis Hartwick, who arrived from Calgary to become our Training Officer and OIC Transport, Maintenance and Recovery Platoon. Welcome also to those many others who also have rotated in over the past few weeks. Some are old Germany hands, and their extra experience will prove valuable in the days ahead. We hope all the new boys enjoy themselves over the next three years.

The last two weeks saw a novel experiment undertaken here. Our brothers in wrenches from 7 Armoured Workshop REME in Fallingbostel have been very hospitable to members of our unit during various schemes in the Hohne area. Therefore, to further the report we've established with them, we exchanged mobile repair teams for two weeks. Up there went Sgt Crowell, Cpl Amero, Cfn Evans and Cfn Chapman from our FRP. In return we got a British leader and his three man team; S Sgt Wyartt, L Cpl Pearson, L Cpl Williams and Cfn Morter. The experiences working on each others' equipment were very worthwhile, and, while they showed us a few new wrinkles, we managed to show them some too. In fact our team easily beat (so they claim) 7 Armoured Wksp's time for Centurion engine changes. Since their people have had much more experience at this type of thing we're pretty proud of our boys. The experiment proved so successful we hope to repeat it during Soltau. In fact, we suspect that at least three of the four REME people now want to switch to the Canadian Army (RCEME, naturally). They just couldn't resist our food, pay and (Shack 42) amenities. We'd love to have them too—they were good tradesmen and good friends.

A new sport is sweeping Fort Chambly like wildfire, and has, naturally enough, infected Workshop personnel. All you need to play is a few mice, an air pistol, a steady eye, and a lot of patience. While no one has racked up any phenomenal scores, we keep the mice in trim by keeping them running. The ground around some of the buildings is so full of lead from near misses that could be profitably mined. The ultimate weapon for the sport, we've found, is the Colt 45 automatic wielded by our shack 42 experts on the rats in the dump. We understand no one has made any kills yet, but we have the most thoroughly terror-stricken rats west of Hameln. It's a good way to improve your marksmanship and keep the rodent population down (if we could only hit any).

(Extract from the Beaver 25 Aug 67. The newspaper of The Canadian Army in Europe).

TECHNICAL NOTES

M113A1 - RAMP CYLINDER KIT

A new kit 2590-00-906-0147 supersedes kit 2590-968-7777. The new kit does NOT contain a cylinder head.

If a new head is required the cylinder wall is also damaged, therefore the complete cylinder should be changed.

ASSESSMENT EXAMINATION

As in past years, the selection for Group 4 career courses will be made from candidates who have passed the Pre-Group 4 Assessment.

The next Pre-Group 4 Assessment Examinations will be written on the 19th and 20th February 1968.

The Pre-Group 4 Assessment Training Standards booklet dated February 68, and nomination cards have been distributed. Prospective candidates should study the applicable contents.

Nominations are by cards and must be completed by the candidate, at present to reflect accurate detail as to Rank, Trade Qualifications (to include the trade and group level held) and examinations the candidate wishes to write, Academic and/or Trade. The color of the nomination card is light green.

The Pre-Group 4 Assessment Standard booklet details the examinations to be written for each trade. The references are listed and should be used when studying for the examination.

Questions concerning Pre-Group 4 Assessment should be sent through proper channels to The RCEME School, Attn: ACI (Quality Control).

NEW INTER-COMMUNICATIONS

The new intercommunications systems in hospitals are undoubtedly efficient and timesaving, but they can also be a little frightening, especially to an eight-year old boy.

It was one of those nights when staff of the pediatrics ward was depleted more than usual, and the supervisor was concerned about little Johnny, who was in a private room at the other end of the corridor. She pressed the button on the intercom and inquired softly: "Johnny, are you asleep?" There was no answer, so she spoke again: "Are you all right, Johnny," Finally the nurse detected a frightened response: "What do you want, wall?"

RCEME FIELD OPERATIONS

By WO2 CE Taylor

In respect to a recent article written by Major P Bateson in the Technical Bulletin I suggest his ideas on certain aspects that relate to the formation of the Electronics Platoon can be amplified; otherwise his article was excellent and practical in most situations.

As background for this article I served for three years under the command of Major Bateson, returning from Europe last July. I was WO IC of Electronics Section of Weapons and Electronics Platoon and for three years I banged my head against the wall but not that it's over I realize that the experience gained is certainly and asset.

While I was with 4 Fd Wksp I submitted a brief on the practical aspects of having control over the Electronics Section of Aircraft Platoon (A/C Pl) (not that I am an empire builder) but, in my opinion production suffered due to this arrangement. The A/C Pl has two fully equipped electronic repair vehicles and five Tradesmen, for the periodic inspection and repair of helicopter and light aircraft communications equipment. They also have Radio Technicians farmed out to user units. In respect to my brief forwarded through normal channels of the workshop for perusal by all concerned and action taken where feasible - no action or comments to date. This is basically the reasons behind the brief.

The bulk of the workload is helicopter, which can land anywhere an electronic repair vehicle may be situated, tactically or otherwise.

The Ordnance Field Park is situated in close proximity to the workshop for supply of parts not held by the Supply Platoon. The latter is integral to the main user i.e. the Field Workshop. Because in most tactical situations the Aircraft Platoon is divorced from the workshop, a vehicle must be sent by night, or if allowable by day, to the Supply Platoon or the OFP to pick up parts.

If repairs are required by a light aircraft when facilities for landing are not available at the workshop, a vehicle is despatched to carry out repairs in situ or to the nearest landing strip depending on the airworthiness of the aircraft and the tactical situation. Of course the trouble must be diagnosed and the replacement part or assembly accompanies the repair team. This information is communicated by land lines or radio to the workshop from the information obtained by the radio technician at the user unit for onward transmission to the repair facility.

Periodic Inspections and communication failures do not, in my opinion employ fully the radio technicians, vehicles or test equipment. This section is not involved in brigade inspections eight months of the year, therefore no time is lost from production. This fact was substantiated over a period of three years, aircraft and helicopters landed in the vicinity of A/C Platoon, for repairs or periodic inspections. I would venture to say that actual production time

expended over a period of time would involve two vehicles and three technicians to satisfy the maintenance and repair requirements of the Brigade for 2nd Line Maintenance with the present number of equipments held. Due to leave, sickness schemes and future commitments etc, the establishment should be increased by one radio technician. Two or three types of basic radios are employed in the aircraft and helicopters although the set-up for repairs to this equipment within the two repair vehicles is split, by this I mean one 2½ ton Shop Van is capable of repair to one or two basic radio systems, while the other is set up to handle the remainder. This is not flexible nor desirable and should be rectified so that any Electronic Repair Shop Van is capable of handling all repairs necessary to the brigade system. If one vehicle is destroyed, damaged or out of action for any reason, the repair capability of that vehicle is lost and repairs to the individual equipments handled solely by that vehicle cannot be duplicated.

If the two Electronic Shop Vans of A/C Platoon were incorporated within the Electronics platoon an improvement in morale, working conditions, command and control and parts supply would take place.

Supply of parts would be readily available from Supply Platoon or OFP.

Working conditions would improve due to the environment of being with technicians who talk the same language, realize their problems, suggest methods of production improvement and most of all production can be amalgamated within the capabilities of a platoon system. No doubt the radio technicians now employed by A/C Platoon, where they are a separate entity within that platoon, may welcome the idea of being part of Electronics Platoon. There is no doubt in my mind that these facts would raise morale and increase production possibilities with trades upgrading due to the concentration of many years of experience and knowledge available in one platoon.

Command and control would be improved if implementation of the line diagram shown below is followed. It details the proposed establishment positions and vehicle requirements.

The reasons for an increase in personnel and vehicles are given below.

One captain electronic specialist is required to add teeth to this platoon's command and control requirement. He should be a communication technician with twenty or more years service; commissioned from the ranks where experience and know-how have been gained through a variety of positions held.

The 2 IC should be a WO1 with fifteen or more years service with the experience necessary to handle the position of command and control, production and tactical situations.

A total of fourteen men and five vehicles is required by the Communication Section due to the increased work load, resulting from brigade inspections, APC's (all types) and the increase in new equipment now and in the future.

The Electromechanical Section calls for fourteen men and four vehicles to handle it's many tasks from instrument repair to navaid and infrared detection devices.

Radar and Guided Missile Section calls for six men and three vehicles to handle ENTAC, Counter Mortar Radar, Tellurometers, and many other sophisticated deivices.

Aircraft Section employs four men and two vehicles which handle periodic aircraft inspections and second line repairs to helicopters and light aircraft. This section should be increased in vehicles and personnel as the projected new equipments are taken into field use.

Many factors relating to the operational characteristics in static and tactical environments must be considered with regard to personnel and vehicles within the field workshops commitments as shown:

Personnel on leave, in hospital, on course, duties, brigade inspections, sports, etc are all contributing factors relating to lost of production. Confused tactical moves and platoon or workshop defences along with supplying the Brigade Admin Area with troops for special assignments such as holding brigades or delaying actions.

Tactical moves and platoon defences which involve troops to be employed on a twenty-four hour basis certainly affect the quality and quantity of repaired equipments, especially for those personnel employed in highly skilled and detailed work. They will not be alert on detail, and performance will suffer.

I realize that all details in this paragraph are necessary evils to field operations therefore adequately trained personnel in field tactics and defences along with efficient equipment and highly skilled tradesman are required to fulfill this role. No tradesman who is not highly skilled, a minimum of five years experience in electronics, or electromechanical trades should be posted to employment in the Electronics Platoon for the following reasons:

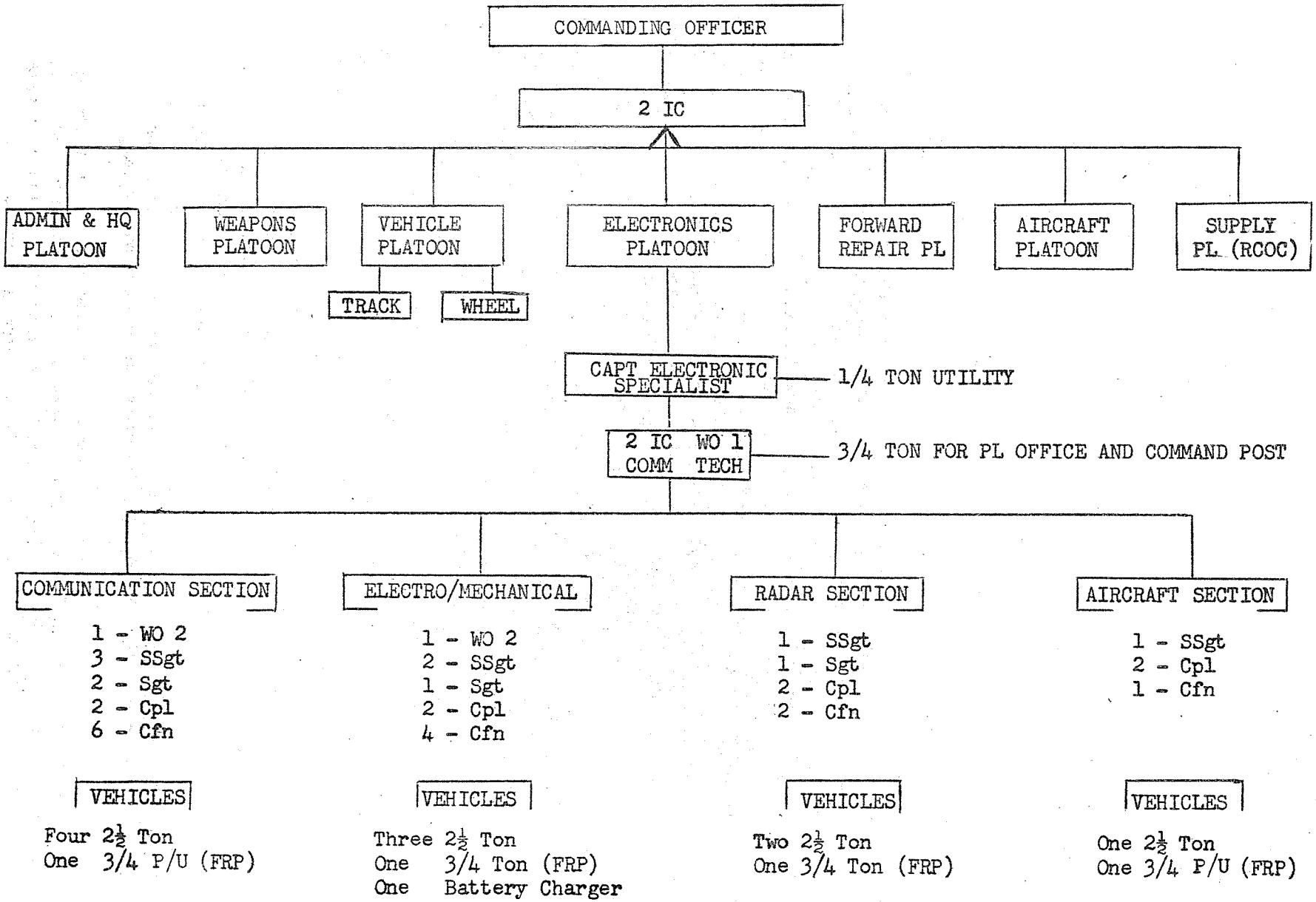
Production has to be accomplished as time permits and quality control should not suffer.

Test equipment, vehicle inside working space and tools are in limited quantities.

Generator problems mostly relating to voltage instability, poor gas, shutdown during preventive maintenance, non-availibility of parts. Carburetor icing of PE95, 10KW generators can be costly. For three years in Germany I venture to say that five hours per week the Communication and Radar Sections were shut down with resulting loss of many hours of production time. (Over a period of three years this totals 770 hours times 11 tradesmen is 8470 hours at a cost of $5 per hour is $42,350.) This loss was taken as normal at the time due to antiquated generators not suitable for the job. They must perform reliably in all types of environmental conditions. This can and must be overcome by reliable and stable sources of power.

All vehicles should be capable of producing their own operating power requirements to carry out production in isolation from the workshop due to forward repair, special commitments and the tactical situations they undergo.

Trailer-mounted generators should be done away with entirely. All power sources, to meet present and future needs, should be mounted on the vehicle it will power. The advantages of this suggestion are many, the prime factor is tactical. During moves and alerts much time is lost and accidents caused by making the trailer and generator capable of safe movement and hooking-up the trailer to the towing vehicle. Air brakes, lights, safety chains, directional signals and pintle-hook must be checked out before movement. Now we have the trailer and towing vehicle ready to move, movement presents no problem unless backing up the vehicle and trailer is required. The factors stated are dependent on the tactical situation, if you have control of the air and ground then you have the time necessary to expend to complete the move with ease. Most moves are made because the enemy is closing in or deployment in another area of support is required. I have seen vehicles lined up on a main highway or secondary road for 1500 yards because parking of vehicles and trailers was difficult at the new workshop site. Most moves are made at night adding to the time required to get the workshop vehicles off the road into their new positions. This takes much time and fraying of nerves due to trailers jack knifing, hitting objects or getting stuck in unfamiliar ground. Let's get rid of trailer-mounted generators unless they supply a complete platoon during static situations where economy of operation and maintenance costs would be reduced by the use of one power source with the need for only one vehicle to tow it from one site to another thereby justifying it's existance. This paragraph can be applied to the entire independent brigade, it means new equipment and larger vehicles but let's look forward and project to the future where movement in times of conflict is of prime importance. If a vehicle is destroyed due to its inability to move without delay you have lost men and vehicles, due to its inability to move without delay you have lost men and vehicles, your fighting and support elements are thus limited as to their capabilities.


COMMANDING OFFICER
2 IC
ADMIN & HQ PLATOON
WEAPONS PLATOON
VEHICLE PLATOON
TRACK
WHEEL
ELECTRONICS PLATOON
FORWARD REPAIR PL
AIRCRAFT PLATOON
SUPPLY PL (RCOC)
CAPT ELECTRONIC SPECIALIST
1/4 TON UTILITY
2 IC WO 1 COMM TECH
3/4 TON FOR PL OFFICE AND COMMAND POST
COMMUNICATION SECTION
1 - WO 2
3 - SSgt
2 - Sgt
2 - Cpl
6 - Cfn
VEHICLES
Four 2½ Ton
One 3/4 P/U (FRP)
ELECTRO/MECHANICAL
1 - WO 2
2 - SSgt
1 - Sgt
2 - Cpl
4 - Cfn
VEHICLES
Three 2½ Ton
One 3/4 Ton (FRP)
One Battery Charger
RADAR SECTION
1 - SSgt
1 - Sgt
2 - Cpl
2 - Cfn
VEHICLES
Two 2½ Ton
One 3/4 Ton (FRP)
AIRCRAFT SECTION
1 - SSgt
2 - Cpl
1 - Cfn
VEHICLES
One 2½ Ton
One 3/4 P/U (FRP)

THE FIGHTING FORWARD REPAIR PLATOON IN 4 FIELD WORKSHOP

By Captain J.I. Hanson

BACKGROUND

The Forward Repair Platoon (FRP) in Germany was formed to carry out in situ repairs to tanks of the Brigade Armoured Unit. It consisted of a headquarters, a number of three-man tracked vehicle teams, and some supporting tradesmen (a welder, a weapons team and a radio team), plus wreckers.

When the APC was introduced into 4 CIBG, the platoon was expanded by adding a number of two-man wheeled teams. These also carried out repairs to essential B vehicles (radio vans, wheeled CP's etc) in situ. Wheeled teams were also used to carry out in situ repairs to B vehicles of units training in locations remote from the normal Brigade area (for example, artillery units training in Munsterlager South, and infantry units training in Haltern.)

By Sennelager 1967 (i.e. June) the platoon consisted of a Headquarters, a tracked, and a wheeled section. The Headquarters included a Captain, a WO2, two M62's and drivers, a welder, two cooks, and an attached Signals team. The signallers provided communications on the Brigade Administrative Net. The wheeled section, headed by a SSgt, consisted of up to four two-man teams. The tracked section, also headed by a SSgt, consisted of up to five three-man teams. In addition to normal repairs, the platoon carried out EFR investigations and did its own unit maintenance.

During Sennelager, some of the men suggested integrating the Tracked and Wheeled teams. The idea was instituted on a trial basis. The headquarters remained the same but new three-man teams were made up, consisting of both wheeled and tracked mechanics. The advantage is that now any team can tackle any type of vehicle repair. Previously there were many cases of one section being overloaded while the other was only lightly committed. Integration of teams tends to equalize the workload, and provides a more flexible organization. Time will indicate how the new system will work.

THE TEAM

The basic workhorse element of the FRP is the Mobile Repair Team (MRT). It now consists of a Sergeant or a Senior Corporal and two other mechanics. They operate out of a 3/4 ton truck, which carries their tools, kit, food, beer, hootchie, etc. The parts are towed in a 3/4 ton trailer behind the team vehicle, or in a 1 1/2 ton trailer behind a wrecker.

The FRP mechanic is a "Lone Scouter". He must operate in the forward areas, virtually on his own, often under very uncomfortable conditions. A considerable load is put on the team leader, who has to find the casualty, plan the workload, help carry it out, and look after the comfort and safety of his team. A high degree of initiative

is demanded of all team members, and there is always a genuine desire to get the casualty repaired as quickly as possible. The FRP mechanic is not often the cleanest (or soberest) man in the RCEME Workshop, but he is the hardest working. Therefore when he relaxes, he really relaxes; and when off duty he finds "different" ways to amuse himself? He is quite a scout, once experienced in MRT work, worth his weight in Heinekens'.

OPERATIONS

The platoon is equipped to operate independently forward of the Brigade Adm Area in the Field. Tasks usually arrive over the Brigade Adm Net in the form of a standard repair request. The assigned team draws the parts from the platoon's attached spare parts section and proceeds to the job. If the unit's M62 is not available to assist the team, one must be requested from FRP headquarters. Occasionally teams may have to draw extra tooling, which is available in a 2 1/2 ton stores lorry at platoon headquarters.

In garrison the system works the same way, except that requests may be made by phone or on 2149's. In many cases the section staff sergeants make out 2149's for the unit to expedite the paper flow.

The biggest single hindrance to smooth operations is the lack of internal communications. Once a team is dispatched, all communication between it and platoon headquarters is lost. In some cases time is wasted because teams return to headquarters for redirection when casualties are not at designated locations. Radio communications would solve this control problem.

THE BRITISH SYSTEM

A British MRT consists of a senior NCO artificer and three corporals/craftsmen. They operated out of a 1942 White half-track with an A-frame on the front. It proved to be a surprisingly versatile vehicle. However, the replacement vehicle is the FV 434; a fitter's version of the standard British APC, the FV 432. This vehicle is a steel, tracked vehicle with a large cargo compartment in the rear and a HIAB crane on the left side. The British prefer the half-track to the FV 434. The half-tracked vehicle has more room for creature comforts, and because the HIAB cannot provide straight lift. They claim the FV 434 requires more maintenance than the half-track. However, the APC is amphibious, which gives it an edge over its ancestor.

The British Forward Repair Group (FRG) can be considerably larger than our FRP, as it may be called to support (in an armoured brigade anyway) both Centurion and Chieftain tanks, FV 433's (the Abbot 105 mm SP), and standard FV 432 APC. This justifies the artificer as team leader! Each FV 434 (or half-track) is equipped with a radio. The FRG HQ can communicate with all its teams on this REME net; and other units via the Brigade or Divisional Adm Net. Under ideal circumstances the REME net also contains all LAD commanders as well as the CREME, recovery elements etcetera. By radio, teams can be effectively controlled by the FRG commander for weeks without visual contact. Teams check in by radio when a repair is completed and are directed to another. Parts are dispatched by vehicle or helicopter to arrive at the new location.

The system is very effective and provides excellent second line support with the maximum of centralized control.

The 7th Armoured Workshops REME is doing trials on tank scheduled maintenance. Changing engines and other assemblies at a fixed mileage rather than waiting for failures. This is very expensive. However, it does stablize the FRG workload and reduces emergency repairs during exercises. It merits careful study.

DISADVANTAGES OF FRP OPERATIONS

In the Canadian FRP operation there is too much non productive time, which is travelling time. During operations travelling exposes teams to ambushes, air attack and other hazards. Communication with teams after they are dispatched, is almost impossible. For example, if the platoon headquarters moves, there is no direct communication with teams out on jobs to inform them of the move, or new location. Therefore, it becomes necessary to leave a rear party in the old location (not always possible) or inform the units nearest the teams' work area (via the Brigade Adm Net) and trust the unit will inform the team. Other disadvantages, are: travel time factor, the lack of control, poor communication, and exposure to danger of tradesmen during operations.

ADVANTAGES

The main advantage of the forward repair system is that it is excellent training for a team leader normally a junior NCO. It produces independent, self-reliant, and skilled tradesmen faster than any other type of operation. It rapidly weeds out inefficient NCOs and quickens the man, who has the potential as a leader. For this reason FRP justifies its existence.

The in situ repair does cause tradesmen to expend considerable time, while travelling. However, in situ does reduce overall repair time, by eliminating the recovery to the workshop, and return to units. The workshop is not cluttered up with iron monsters waiting repair.

FRP operations permit, indeed demand, a centralized holding of second line spare parts. This centralization permits stocks to be kept reasonably low, and fewer vehicles required to haul the parts.

There are other advantages to FRP operations. The main ones are; high training value, better customer service, tight control on parts, and saving in recovery services. Control over men in the field could be improved, by the issue of radio sets. Radio communication will alter this situation tremendously. (The British FRG people were horrified to learn we didn't have wireless communications -- they didn't believe it possible to operate without radios.) The whole system is flexible and can adapt itself to a variety of tactical and administrative situations.

(It should be noted that the Weapons and Radio MRT's are seldom employed with the FRP. They are attached semi-permanently to the Weapons and Electronics Platoon, where they can be used most efficiently. The British, on the other hand, do a great deal of electronic repair on an MRT basis. They find it inefficient, but it provides better customer service.)

THE FUTURE

It has been proposed that the FRP be split up, and its component MRT's be permanently posted to the arms units, along with their spare parts. This would give the major units their own second line, tank and APC repair capability. Increase the flexibility of the maintenance platoons/troops, and eliminate most of the disadvantages. It is less economical on parts holdings and the employment of tradesmen. However, it does disperse the parts throughout the forward area, making it less exposed to total loss by one strike. It increases the size of the maintenance platoon/troop to the point where it becomes cumbersome for one officer to supervise. Most important, it removes or reduces the excellent training opportunities, which the present FRP provides. For reasons stated it should not be done; at least not in peacetime.

DEBATABLE

You may disagree. If so, why not write the Technical Bulletin and state your views? We could use some debate on this subject; there are many who would delight in arguing the merits of the FRP ad infinitum. How about it?

MAN AND HIS MACHINE

By Major R.D.L. Connell

Those of you who visited EXPO 67, may have wondered just where man actually stands in relation to today's rapid advances in technology. Just as the industrial revolution removed the burden of physical tasks, todays revolution, with the advances of the computer, are removing burdensome mental tasks. But where are we going? With computers that can be programmed to design computers, and "breeder" reactors to produce almost limitless power, are we in danger of producing a machine which will control man?

The phenomenal growth of the computer, which has displaced many persons doing routine jobs, we find on close examination, is actually limited by the present state of the art. This machine, which can process information at the rate of 10^7 bits per second (this is about 21 times the entire contents of the Bible each second) compared to mans ability to process information at 35 bits / second; does not require overtime pay or coffee breaks; will not misinterpret or forget instructions or change its work rate due to noise, is actually inferior to man in other ways. Instructions to it must be precise, or it will not accept them. It cannot efficiently accept information where hearing or sight is required. The storage capacity is actually limited. Man's memory is capable of storing 10^{14} times as many bits of information as the best computer. A technological breakthrough would be necessary to approach this capacity. None is in sight.

The computer then is a machine which can do simple tasks very rapidly. These tasks however must be detailed by man as it has no reasoning power of its own. The forecast that computers would be developed as unbeatable chess players has not come about. All possible combinations of moves can be programmed for about 5 moves ahead, which is a long way from the chess master class. Even its rate of operation is becoming limited due to the speed of electricity between components. This is one of the reasons for the development of integrated circuitry. Present developments have placed 250,000 transistors on one square inch of surface. Bell Laboratories feel that the technological limit is about 10^6 transistors per square inch.

The computer then is an excellent tool to be used in combination with man's logic and reasoning. It can eliminate repetitive mental tasks and allow man to devote his time to original thought for which he is better equipped. A large backlog of the uses of this combination of man and machine exist at the moment due to developments over the past decade. Shared time systems in which man's relatively slow inputs are dovetailed, make simultaneous operation by many users possible. It is said that remote control terminals operating over telephone lines will become a bigger industry than telephones themselves, over the next ten years. This is already technically and economically possible.

The computer can never control man by itself. It will have a great influence on the way we all live and work, but its output will always be the result of input by some human being. The computer is not yet ready to replace man completely. Man and his machine will get along for some time yet to come.

A TECHNICAL GROUP FOR THE CANADIAN FORCES

By Major D.V. Geary

Having recently returned from three years in U.K. employed in the Headquarters of an organization known as Technical Group REME, I am of the opinion that there is a requirement for a similar organization within the Canadian Forces. Before Integration none of the three Services was large enough to require such a group, since within smaller forces the technical matters were capable of being handled on a more personal basis. Under our present functional command organization, I can see signs of slight conflict in the technical interests already, which could lead, in time, to conflicting instructions, varying systems of performing technical tasks, and ultimately differing technical equipments between commands.

Heaven only knows which command would be called upon to administer and direct a "Technical Group" if formed, but I feel that the arguments for its formation are irrefutable.

In order to clarify some of those arguments I will try briefly, without delving into too much organizational detail, to outline some of the functions that Tech Gp REME undertook while I was serving with it. Broadly speaking, they divided the functions into three categories:- (a) Inspection Services, who controlled the Vehicle Depot Workshops and issued all instructions concerning technical inspections and criteria of performance of equipment; (b) Production Wing, who controlled the base workshops, and planned national production schedules (and which, erroneously in my opinion, contained sections on workshop techniques and work study); and (c) Engineering Wing, in which I was employed and which, I feel, is most pertinent to the Canadian Forces to-day. The sections on workshop techniques and work study should be included in the Engineering Wing organization, and this organization would then be most helpful in overcoming the technically oriented problems besetting the present functional command structure. For the practical purpose of dividing into manageable groups, the engineering wing was divided in two, a "Mechanical" group and an "Electrical" group. Each group consisted of a very small HQ, a number of engineering branches, a scales branch, and several "Maintenance Advisory Groups". The division of the scaling function into two sections should not be emulated in this country, and, in fact, steps were being contemplated to amalgamate the two scales branches when I left U.K. (As a matter of interest they were moving quite quickly towards a "marrying-up" of the scaling, cataloguing, NATO classification, and parts-listing functions. All of these were undertaken by entirely separate agencies, each jealously reserving its right to exist, with very obvious areas of duplication of effort.)

The engineering branches were usually commanded by a lieutenant colonel, responsible for equipments by types (as the names of the branches would indicate), and contained specialists, not only on the various equipments, but also in the functions performed. The Mechanical Wing had the following branches:-

(i) "A" Vehicles and Weapons Branch.

(ii) Vehicles (B & C), Plant and General Branch.

(iii) Defects and Modifications (A and B Vehicles) Branch.

(iv) Fording Trials Branch.

(v) Scales Branch (M).

The Electrical Wing had the following branches:-

(i) Radar Branch.

(ii) Guided Weapons Branch.

(iii) Telecommunications Branch.

(iv) Scales Branch (E).

Each branch was either already sited with, or was intended in the future to be sited with, an appropriate Research and Development establishment. The bulk of the branches' work consisted of the writing of all appropriate technical literature connected with the introduction into service of new pieces of equipment. They were also responsible to answer a very large flow of technical queries which came from all parts of the world, and to acknowledge, investigate, solve where possible, collate and record all defect reports. (Over 5000 were received each year on "A" and "B" Vehicles alone).

The Maintenance Advisory Groups (MAG) are small, highly specialized elements (usually consisting of a REME major and several Warrant Officers - ranging in number from 3 to 8), which worked right inside the appropriate research establishment, but were responsible to the appropriate Technical Group Branch for administration, loading of work, and, of course, to supply early advice on new equipments under study. A move was underway when I left to increase the size of the MAGs and to greatly increase their effectiveness in altering early design as a result of rapid feedback of reliability data on earlier models or similar equipments. (This was to be one of the functions of the REME Computer Centre, which was being constructed at Tech Gp REME when I left.)

Thus it can be seen that Technical Group concerns itself with all technical equipments from their origins, through their introduction into service, and sometimes even after their service life has ended. I feel that, with the integration of Canada's forces, now is the time to introduce such an organization here. It was obvious that, although a good many of the functions mentioned above have been carried out in the past by cells in Ottawa, Montreal and London, the army alone could not justify an organization of the size envisaged. However, by pooling all the technical personnel of the three services, it is probable that an overall saving of technical manpower could be achieved. Even if a saving did not occur, certainly a more coherent and far-sighted technical service would develop, one that all members of the Canadian Forces could make use of because they would soon learn where it was and what it could do.

EDITORS NOTE: This article is an exact copy of the original submission.

IMPROVEMENT ENGINEERING IN AIRCRAFT MAINTENANCE

By Major P.P. Pospisil

Maintenance Techniques Section (MTS), Standards Research Section, Modification Section, Quality Control Section, Inspection Section, Special Projects Section. These are just a few of the titles by which a small group of NCO's in the Aircraft Maintenance Unit at CFB Rivers are known.

Most NCOs from the maintenance shop have had a tour of duty in this section. At the present time, the section consists of WO2 Currie, SSgt Poole, Sgt Robillard, Sgt Foy and Sgt Perrement (RCAF).

The section is responsible for a multitude of varied tasks in the integrated aircraft maintenance shop. As quality control inspectors, the NCOs carry out supervisory and independent inspections on aircraft to guard against the possibility of faulty maintenance or unserviceabilities that might be overlooked; engine canisters require monthly inspections for correct pressurization; returnable parts going back to Supply have to be inspected, tagged and reported; aircraft need weighing for accurate weight and balance records; modification kits have to be demanded and their installation controlled and recorded; aircraft POL requires constant checking to guard against contamination; winterization kits require removal and installation seasonally; these and other tasks make up the normal workload of MTS.

In addition to these recurring tasks, MTS carries out a very important function in maintenance, that of aircraft improvement by modification. No aircraft is perfect when bought and design defects or operational limitations continue to show up through most of its useful life. For example, the CH112 helicopter has had 79 modifications embodied on it since it was purchased in 1961. These ranged from operational items, such as the installation of fire extinguishers, first aid kits and map lights to technical changes to the engine and drive system.

How is a modification developed? Obviously, before anything happens a condition must exist that is unsatisfactory from either the operational or maintenance point of view. An Unsatisfactory Condition Report (UCR) is initiated and at this stage, MTS staff, in conjunction with the originator investigate the cause and attempt to come up with a remedy. The answer may lie in a design change which will require a modification to the aircraft. If the solution is simple and obvious, a draft modification instruction is prepared and forwarded along with the UCR for further investigation and approval. If the condition requires design changes, it is either submitted for contractor or manufacturer investigation or is completely researched and developed within maintenance section resources.

Prime responsibility for the recommended improvement falls on the aircraft user unit since there are very seldom any instant answers to problems from specialists at higher HQ level. As a case in point, the CH112 helicopter had for several years suffered from a condition referred to as "carburetor hesitation." This appeared as a lack of engine response during the critical period when the pilot applied power to recover from an autorotation or a quick stop manouevre. Previous modification to the carburetor by the contractor had failed to solve the problem. Technicians in the maintenance section had some very sound ideas on how to solve the problem by feeding air directly from the cooling fan housing to the carburetor air intake by means of a flexible hose. This immediately became known as the "Ram-air project."

Authority was obtained to prototype the modification, the kit was manufactured in base workshops and installed on one of the helicopters. Extensive flight testing then began. Results of testing indicated excellent performance when installed on other helicopters and under various temperature and operating conditions. A modification instruction was drafted complete with engineering drawings for manufacture of the kits and submitted for Command approval. Once approved and published, modification of all aircraft can be carried out. An engineering problem was solved by the ingenuity of unit personnel and the CH112 helicopter was on its way to becoming a safer aircraft to fly.

Another type of project which MTS is responsible for is the design and manufacture of special tools for aircraft repair. Maintenance experience with a new aircraft type reveals the need for special tools for ease of maintenance. Special purpose wrenches, gauges, stands and other items have been designed, manufactured and evaluated. One such item was an adapter to fit on the T58 engine shipping container to adapt it for use as work stand in the field. This simple item came up from an ingenious idea thought of by a technician and the idea was converted to a prototype that could be tried. This eliminated the need for duplicate engine stands being carried for changing CH113A helicopter engines in the field.

Collection of data on the trial and evaluation of items falls within the scope of MTS. Field maintenance shelters, L19 skis, helicopter torsional coupling, pilot's seat cushions - these are just a few of the items which have been evaluated and reports written on their suitability.

MTS personnel have completed over 100 projects of an engineering nature over the past two years covering designs, evaluations, technical reports and manufacture of items as well as the routine processing of Unsatisfactory Condition Reports. Many of these have been carried out by other sections within the maintenance section and required only the co-ordination and final submission of the report. However, others have been done by the MTS personnel themselves.

It is not intended to convey the impression that all aircraft improvement is done at unit level. However, a large number of items are within unit resources and can be very effectively carried out by the experienced NCOs within the maintenance organization. Aircraft technicians have the opportunity of solving engineering problems and playing a very important role in making aircraft safer and better to fly.

RADIOISOTOPES AND THEIR APPLICATIONS

By Lieutenant Andrew Nellestyn

INTRODUCTION

Before the advent of the nuclear reactor, the limited quantity and high costs of radioisotopes then obtainable only from particle accelerators restricted their availability to just a few investigators. As such, although their usefulness was widely recognized, radioisotopes were never fully exploited. The development of nuclear reactors for carrying out the U^{235} fission process under controlled conditions, however, afforded large quantities of low cost fission products, particularly radioisotopes of elements from atomic number 30 to 64, as well as high neutron fluxes that would be utilized to produce desired radioisotopes by irradiation of elements in reactors.

The use of radioisotopes has proliferated so greatly in the last decade that a complete description of their many and varied applications would be impossible to mention in this article.

BASIC PHYSICS

Radioisotopes are elements having unstable atomic nuclei, each of which sooner or later achieves stability by sudden emission of a discrete amount of radiation of a characteristic kind and energy. This is known as radioactive disintegration and, although the moment of its occurrence in any one atom is unpredictable, in the quantities involved in practice, statistical laws prevail and each particular radioisotope decays exponentially with a characteristic half-life; this is the time taken for half of the atoms present at the start of the period to have disintegrated. Most of the radioisotopes of interest have half-lives lying between nine months and thirty years, although those having half-lives measured in days also have their uses.

Radiation falls into five groups:

BETA PARTICLES (β) which are fast electrons of nuclear origin emitted by nearly all industrially useful radioisotopes; the maximum energies (and therefore penetrating powers) are characteristic of the emitting isotope. Sources of beta-radiation are used mainly to measure materials ranging in basis weight from 15 to 10,000 g/sq.m. (for example, from thin paper to 1/16 in. steel or $\frac{1}{2}$ in. plastic); beta-emitters also form the active basis of some sources of isotope-produced X-rays.

GAMMA RAYS (γ) which are electromagnetic radiations of characteristic energy emitted by some radioisotopes, usually in association with their emission of β-particles. Gamma-rays are similar to X-rays but are of higher energy; they obey the inverse square law relating distance and intensity, and they are attenuated (but not stopped) by matter to a degree dependent upon its density and thickness. Individual γ-photons (single quanta of γ-radiation) can be detected, but not as efficiently as beta-particles. Gamma-ray sources are used for the measurement of bulk materials or of sections too thick for beta-ray instruments; they can usefully penetrate 4 in. of steel, 3 ft. of masonry, or several yeards in free air.

ALPHA PARTICLES (α) which are nuclear fragments emitted by some of the heaviest radioisotopes; they are little used except for studying gases by ionization, and for producing neutrons by interaction with beryllium nuclei.

X-RAYS which are electromagnetic radiations of lower energy than gamma-rays; they are produced in a range of energies, either directly from radioisotopes or by the interaction of beta-particles with suitable target materials. They are used for measuring thicknesses too great for beta-particles and too small for gamma-rays, for analysis by selective absorption, and for coating-thickness measurement by fluorescence spectrometry.

NEUTRONS which are uncharged nuclear particles that can conveniently be produced by the interaction of alpha-particles with beryllium nuclei. Neutrons are slowed down and scattered more effectively by hydrogen nuclei than by any other element, which enables them to be used in gauges for determining moisture.

CLASSIFICATION OF APPLICATIONS

There are a number of different methods of classifying applications. All of these depend on the particular nuclear properties (radiation) being utilized. The most favoured is that of describing an application as being based on:

(1) the use of the radioactive material (isotope) as a tracer,

(2) the effect of the radiation on matter,

(3) the effect of matter on the radiation (for example, the density of a particular matter).

The first deals with nuclear radiations emitted from the radioactive source in an effort to position or locate a particular material.

The second deals with the radioactive material as a source of energy. This energy is usually electrical in nature. The most succesful of these is the nuclear battery which is capable of producing micromicro (10^{-12}) ampere currents at potentials of several thousands volts. Most of the uses of radiation in this second category benefit from the ionization produced by that radiation. This ionization potential can be used directly as in the case of static-electricity eliminators. In general, the indirect effect of the radiation has been useful in fields such as the initiation of chemical reactions by radiation, the sterilization of food (potatoes, onions - sprout inhibition) and drugs, and the use of radioactive materials at thereapeutic radiation levels in clinical practice (Cobalt 60 therapy - the well-known Cobalt Bomb as manufactured by Atomic Energy of Canada Limited).

The third, and most extensive use in terms of direct economic benefits, deals with industrial radioisotope instruments in the form of gauges and instruments of various types, in which the radiation intensity gives information as to the amount of matter in the path of the radiation. In this third category radiographic examination of welds, quality of various materials, and tool wear come to the foreground. It is with the industrial radioisotope instruments that this article mainly concerns itself.

EXAMPLES OF APPLICATIONS

INDUSTRIAL RADIOISOTOPE INSTRUMENTS

Such an instrument can be defined as a device which uses radiation from a sealed radioactive source in conjunction with a radiation detector to find out something about a material system. Such instruments can be designed and used for an extensive variety of industrial purposes; in practice most of them fall into one or other of the following categories: checking the position of objects; level gauging and package monitoring; thickness gauging; determination of composition.

It must be stated at this point that although radioisotope techniques are in some cases not the only instrument techniques available they are, however, usually the most convenient and economic method of detection and/or analysis.

The type of detector chosen for any particular application will depend upon individual requirements and conditions of operation, in particular upon the type of energy of the radiation, and the counting-rate required. The following are the main types used in industrial instruments: Ionization chambers; Geiger-Muller (GM) counters; Proportional Counters; Scintillation Counters; and Neutron Detectors.

The output signal from radiation detectors is electrical; ionization chambers produce small direct currents which can be amplified and measured. GM, proportional and scintillation counters produce individual pulses which can be counted electronically. The signal usually requires further amplification before it can operate indicators or recorders, or actuate control devices (automatic control). To obtain statistically significant results measuring times must be long enough to smooth out the unevenness due to the random nature of radioactive decay; in practice this means anything from one-tenth of a second for package monitoring (detection of a deficiency of material in a package or detection of improperly filled packages resulting in automatic ejection of that package) to one minute or more for some analytical determinations. Measurements may be expressed as current or counting-rate (disintegration detection), or in units directly relevant to the characteristic being measured (e.g. g/sq.m. for paper), or in terms of deviation from a standard measure at the same time or set beforehand. For some applications the instruments only need to give a simple 'yes' or 'no' signal. Being electrical, the signals can be fed readily into most recording or control systems.

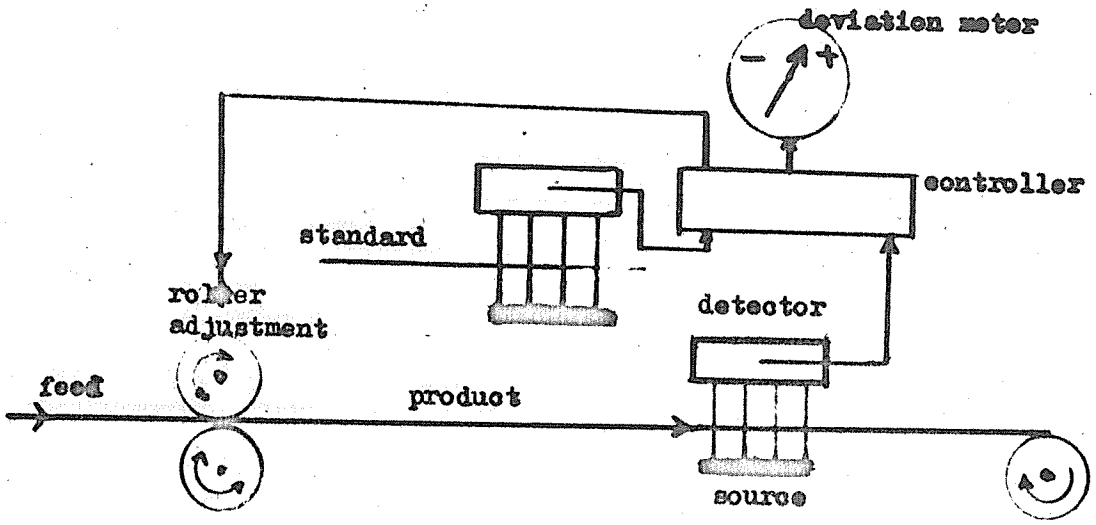
Most industrial radioisotope instruments work by directing radiation from a radioactive source on to a specimen, and detecting or measuring either the radiation that gets through to a detector on the far side (transmission) or the radiation that comes back to a detector on the near side (backscatter or fluorescence). A second small, but widely used, group of instruments operates by responding to changes in the radiation-induced ionization in a gas, brought about by changes in the composition of the gas itself.

WEIGHT OR THICKNESS BY TRANSMISSION

When source and detector are fixed in relation to one another, with the specimen between them, the amount of beta or gamma radiation measured will depend on the mass per unit area (basis weight) of the specimen; this can also be expressed as thickness.

The advantages of such a system are obvious. The device makes no contact with the specimen and therefore cannot damage delicate or fast moving articles; measurement is independent of the physical state of the specimen; response is quick enough for automatic control, accuracy is usually 0.1 to 1% for a measuring time of a few seconds.

Typical uses are: measurement or control of basis weight or thickness of continuously produced material in sheet or strip form, including paper, board, plastic, metal foil or sheet (beta gauges); thickness of heavier sections up to 10 cm steel or equivalent (gamma gauges).

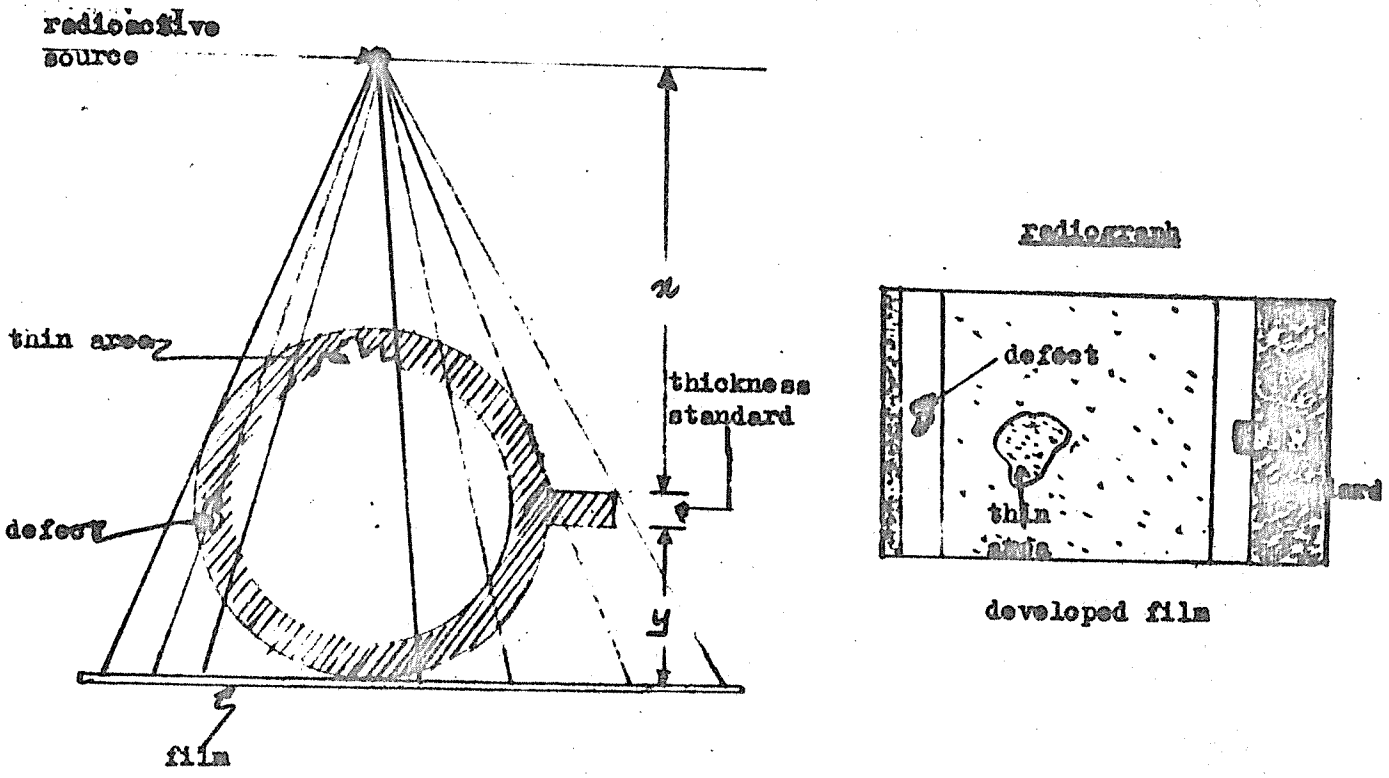


Thickness checking continuous sheet by gamma gauge

RADIOGRAPHY

Reactor-produced Co^{60}, Cs^{137}, and Ir^{192} are now used for inspecting metal castings and welds for possible flaws in much the same way that radium and X-ray devices have been used in the past. Radiography is cheaper and easier to handle and often possesses more suitable radiation energies.

Savings in both material and weight are possible where castings or the joining welds are known to be free of flaws. In designing for the use of welded plate, nonradiographed welds are rated as 80% efficient, whereas the efficiency of radiographed welds is 90%.



Measuring thickness and defects of metal castings using radiography

MEASUREMENT OF WEAR

Considerable improvement in the sensitivity, speed, and accuracy of measurement of metal wear has been realized through the use of metal parts made radioactive by neutron irradiation. By making approximately one atom in a billion radioactive the wear of piston rings amounting to 1/100,000 oz. can be determined. Hence one is able to determine and measure not only the quality and effectiveness of a piston ring but one can also obtain an accurate analysis of engine lubricating oils and their effectiveness in inhibiting engine wear.

In the machine-tool industry radioactive cutting tools are used to measure tool 'life'. Only 6 seconds of actual cutting time is required, during which about 0.3 micro (10^{-6}) grams of wear takes place. Only about 10 millicuries represents the total activity of the cutting tool.

MEDICINE

Radioisotopes also find a wide and varied use in the field of medicine. In medical diagnosis radioactive Iodine ^{131} is being regularly used to measure thyroid-gland activity, brain-tumor localization, and blood volumes. Iodine ^{131} is also widely used in treating thyroid and cardiac disorders.

Cobalt 60 units (1000 to 1500 curies) are being used in place of large X-ray machines for treating deep-rooted cancer. Many other medical uses for radioisotopes exist.

AGRICULTURE

Radioisotopes in agriculture enable the study of mechanism, rate, and extent of fertilizer uptake under varying conditions of cultivation and growth. They are also used to study the migration habits of tagged (radioactive bearing) insects and the fate of tagged insecticides.

CONCLUSION

It can be seen that radioactive isotopes have a wide and varied use benefiting mankind in an immeasurable number of ways. It would also be improper to conclude this article without mentioning that these isotopes when properly used (employing the stringent laws governing the application and employment of radioisotopes) present no hazards to their users.

SOURCES OF INFORMATION

(1) Nuclear Technology Laboratories, Imperial College of Science and Technology, London, S.W.7, Great Britain.

(2) Department of Chemistry and Chemical Engineering, The Royal Military College of Canada, Kingston, Ontario, Canada.

(3) Commercial Products, Atomic Energy of Canada Limited, Ottawa, Ontario, Canada.

(4) United Kingdom Atomic Energy Authority, Harwell, Berkshire, England.

PROBLEM

Simple or Difficult ?

ANSWERS TO SET NO 5

1. R pushes P into A. (2) R returns, pushes Q to P and couples Q to P. (3) R pulls both out of F, and pushes them to E. (4) P is uncoupled. (5) R takes Q back to A.(5) R returns to P, takes P back to C. (6) R running successively through F, D, B comes to A, draws Q out, and leaves it at B.

2. In this solution the pieces successively moved are 2,3,4,4, /R,8,7,3, /2,6,5,5, /6,3,2,7, /2,5,6,3, /7,R,8,5,6,7.

3. A minimum of 15 passages of the river is required. The pattern which is repeated throughout the solution is as follows. Two boys take the boat across the river. One boy remains; the other rows the boat back. A man takes the boat across. The boat is returned by the boy. This is repeated until all the men are across. It is then a simple matter for the three boys to cross.

4. If we number the cells consecutively, then initially the vacant space occupies the cell 4. In the fifteen moves required to complete the transfer, the space will occupy consecutively the cells 3,5,6,4, /2,1,3,5, /7,6,4,2, /3,5,4.

PROBLEM SET NO 6 MISCELLANEOUS NUMBER PROBLEMS

1. An elimination golf tournament is held for (n + 1) players. How many golf matches will transpire?

2. What is the highest score obtainable in ten pin bowling if there are no strikes or spares in the game?

3. What letter follows OTTFFSSE_____?

4. If 3001 digits are required in the pagination of a book, how many pages are contained therein?

5. Just four numbers have the property of being equal to the sum of the cubes of their digits. What are they?

6. The numbers from 1 upwards are written consecutively, ie 1234567 891011..etc. What is the 500,000th digit in this series?

PHYSICAL FITNESS

Physical fitness assumes many forms not the least of which is sports activities. This year the School fielded an extremely successful track and field team in the Canadian Forces Base Kingston Track and Field Meet. The final standings in the meet were:

1ST PLACE	RCSofS	111 POINTS
2ND PLACE	RCEME(S)	78 POINTS
3RD PLACE	1 CDN SIG REGT	16 POINTS

Our congratulations go to all competitors, shown below, for a very fine effort; especially to those who established new track records.

EVENT	RESULTS RCEME (S) COMPETITORS
100 YD DASH	1ST Cpl PARIS, 3RD LT RV POTTER
220 YD DASH	2ND Cfn ZIRK DRE, 3RD Cfn GAGNON 4TH Cfn LIVINGSTON BD
440 YD DASH	3RD Cfn ARSENAULT JAE, 4TH Cfn CAMPBELL FD
880 YD RUN	4TH Cfn App DIONNE JJB
1 MILE RUN	4TH Cfn ARSENAULT JAE
3 MILE RUN	3RD Cpl COLETTE MJJ
6 MILE RUN	3RD Cpl COLETTE MJJ, 4TH Cpl HINCH SSC
440 YD HURDLES	2ND Cfn ARSENAULT JAE
4 x 220 YD RELAY	1ST Lt DD DORMAN, Cfn ZIRK, Cfn LIVINGSTON Cfn GAGNON, 1 min 38.3 secs NEW RECORD
4 x 440 YD RELAY	2ND Lt DD DORMAN, Lt RV POTTER, Cpl COLETTE MJJ Cfn CAMPBELL FD
DISCUS	1ST Lt DD DORMAN, 4TH Bdr RODGERSON AJ
HAMMER THROW	2ND Bdr RODGERSON AJ
JAVELIN	2ND Lt JGG NAPPERT, 3RD Cpl GARRISON TLD, 4TH Cfn LIVINGSTON BD
RUNNING LONG JUMP	1ST Lt RV POTTER, 3RD Lt E HOUSKEN
TRIPLE JUMP	1ST Lt RV POTTER, 2ND Lt E HOUSKEN
HIGH JUMP	1ST Lt DD DORMAN, 5ft 8½ in NEW RECORD
POLE VAULT	1ST Lt DD DORMAN, 11 ft 2 in NEW RECORD, 4TH Cpl RASPBERRY EM

HIGH AGGREGATE FIELD - WITH 15 POINTS (AND TWO NEW RECORDS) FROM RCEME (S) Lt DD DORMAN

HIGH AGGREGATE TRACK AND FIELD - WITH 12 POINTS FROM RCEME (S) Lt RV POTTER

-N E W R E C O R D S

Lt. Dave Dorman, a graduate of Royal Military College, with a Bachelor of Engineering in Electrical Engineering is one of RCEME's athletes.

At Royal Military College he was awarded the "PRINCE OF WALES TROPHY" for best all around athlete. He was active in 30 sports and excelled in track and field events, especially pole vault, and 120 yard hurdles. He won the college decathlon 4 years and therefore the "RAINNIE BUGLE" was renamed the "DORMAN BUGLE".

Lt. Dorman came first in the Canadian Decathlon and fourth in Pan American Decathlon. He won three events at the Canadian Forces meet in Ottawa, where he high jumped 6 ft, 1 inch; pole vaulted 11 ft, 9 inches and long jumped 21 ft, 5 inches. Some of his better times and distances this summer were, pole vault 12 ft, 6 inches; high jump 6 ft, 2 inches and long jump 22 ft, 10 inches.

Lt. Dorman at Canadian Forces Meet, Ottawa
Height SIX FEET ONE INCH for a first

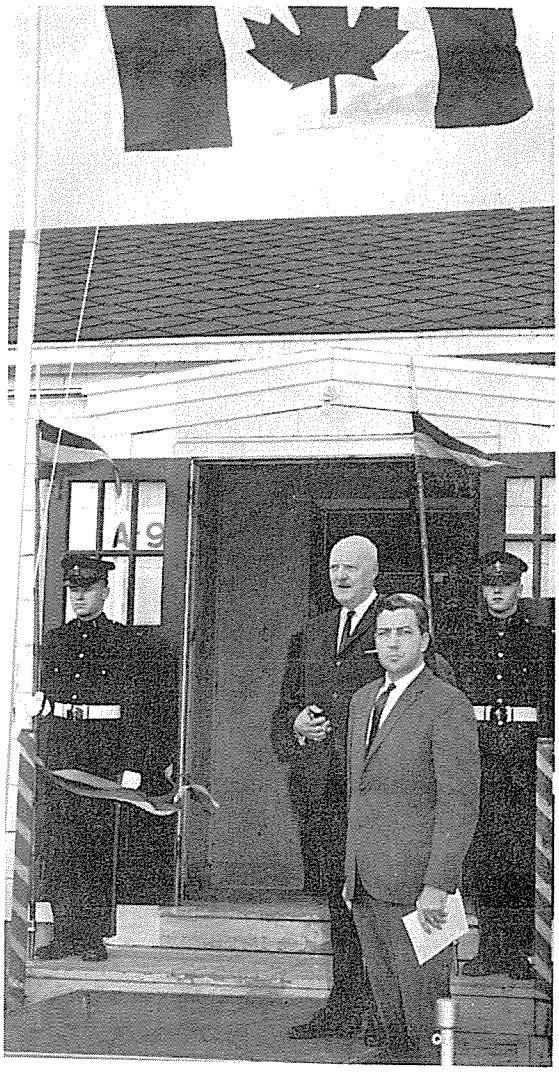
ONTARIO RCEME GOLF TOURNAMENT 1967

By Major B.M. Deibert

It started out to be such a beautiful day on 18 July 1967 as 78 golfers from Ottawa, Kingston, Petawawa, Toronto, London and Borden teed off for the annual tournament on the links at CFB Borden. For some of the participants it turned out that way all the way. Unfortunately only about half of the competitors had completed 18 holes when the heavens broke open and deluged the course. It was a spectacular thunder storm accompanied by torrential rains lasting almost two hours. Still some hardy individuals had the courage and determination to finish play under those truly adverse conditions. There is no doubt that we have in the Corps some of the most avid golfers and keenest competitors.

Despite the dampener from the unkindly weatherman, it was another fine meet. It was nice to see ex-RCEME Lt Col Max Robinson, WO2 Harry Hutley and Cpl Jim Hill in the crowd. We hope they enjoyed the outing with the gang and that they can come back again in future years.

Because of the rude intrusion by the weatherman, only the scores from the front nine holes were used to determine the winners. Sgt Larry Cleveland from 2 Fd Wksp Petawawa took the 14 Coy RCEME trophy and first prize with low gross. The team of Ssgt Holly Vieweg, Capt Doug Clarke, WO2 Alec Colson and Cpl Buddy Redman from Borden won the team trophy donated by 2 Fd Wksp and Base Maintenance Section CFB Petawawa. A team of six from each area/base was eligible to compete for this trophy using the four lowest net scores to determine the winner.

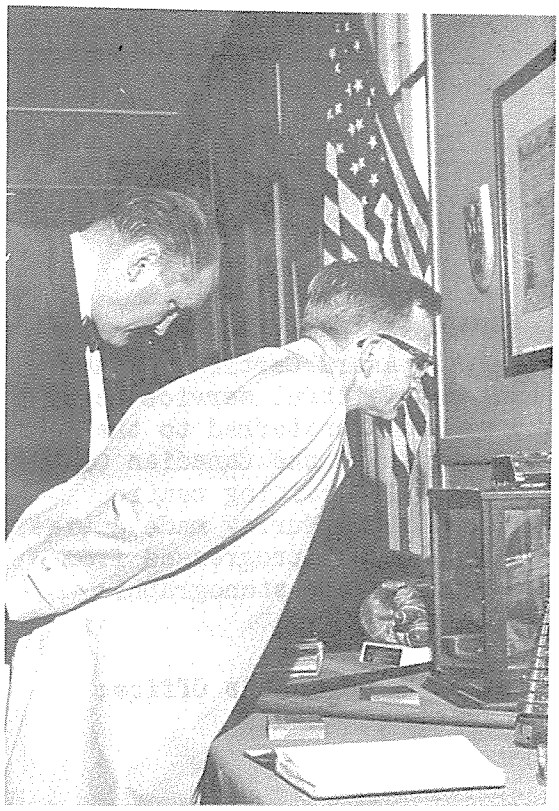


MUSEUM

Colonel R A Cambell, OBE, CD cut the ribbons, officially opening THE CORPS OF RCEME MUSEUM on 21 October 1967

Plans for this museum were made by Colonel K R Ward, CD who appointed Major (now Lt-Col) R F Fendick, CD as the first chairman and Sgt Thibault ENV (now) retired) as curator. The museum committee now consists of five members who are;

Chairman Major RDL Connell
Secretary Capt DH Cumming
Treasurer Lt HT Edworthy
Member Capt HJ Hellard
Curator Cpl AF McSween



Members of the RCEME CORPS ASSOCIATION; military men, and their dependents watched the ribbon cutting ceremony while the "RCEME CORPS MARCH" was played by the R C E M E S C H O O L B U G L E B A N D.

YOUR NAME is on a nominal roll compiled by Colonel RHC Hodgson CD. This nominal roll is in the museum.

VISIT YOUR MUSEUM and place your signature opposite your name which is printed in the "CORPS OF RCEME NOMINAL ROLL"

LONG SERVICE AWARD CERTIFICATE AND PIN

Colonel AL Maclean CD, Head of Corps and Commandant of THE RCEME SCHOOL, presenting a Long Service Award Certificate and pin to Mrs Emily Lola Murray. Her long and faithful service began with the Federal Department of Transport and transferred to the Department of National Defence and employed with the Canadian Ordnance and EME Training Centre A-21. When this training centre became the RCOC School and THE RCEME SCHOOL; Mrs Murray made a wise decision and remained with THE RCEME SCHOOL. She progressed from typist to stenographer, and is very capable of any stenographic work.

The presentation was made in the Commandant's Office; where photographs of past commandants appear pleased.